PROJECT SUMMARY SHEET

PROJECT TITLE NAME: BROWN COUNTY WATER QUALITY IMPROVEMENT PROJECT
NAME AND ADDRESS OF LEAD PROJECT SPONSOR:
City of Aberdeen
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Aberdeen, SD 57401
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STATE CONTACT PERSON: Barry A. McLaury TITLE: Environmental Program Scientist

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STATE: South Dakota WATERSHED: Elm Lake, Elm River, Willow Creek, Moccasin Creek, Maple River, **Richmond Lake**

PROJECT TYPES: [ ] BASE [X] WATERSHED [ ] GROUNDWATER [ ] I&E

PROJECT TYPES	**WATERBODY TYPES**	**NPS CATEGORY**
[ ] STAFFING & SUPPORT	[ ] GROUNDWATER	[X] AGRICULTURE
[X] WATERSHED	[X] LAKES/RESERVOIRS	[X] URBAN RUNOFF
[ ] GROUNDWATER	[X] RIVERS	[ ] SILVICULTURE
[ ] I&E	[X] STREAMS	[ ] CONSTRUCTION
	[X] WETLANDS	[ ] RESOURCE
		[ ] OTHER

EXTRACTION
[ ] STORAGE/ LAND DISPOSAL
[ ] HYDROLOGIC MODIFICATION
[ ] OTHER

SUMMARY OF MAJOR GOALS: The Brown County Water Quality Improvement Project will address nutrient and sediment loadings in the Elm Lake, Elm River, Maple River, Moccasin Creek, and Richmond Lake watersheds. Reducing non-point source pollutants in the watersheds will: improve the water quality for downstream drinking water users, improve habitat for upland and aquatic species, and improve the recreational uses of the water bodies located within the project area. Improving vegetation and managing grazing along these water bodies will reduce shoreline erosion and provide buffers which will prevent nutrients and sediment from entering the lakes and streams. In addition, improved vegetation will increase the aesthetic quality of the streams and enhance the fishery.
Reduction of sediment and phosphorus entering the system will be accomplished using Best Management Practices (BMPs), such as no-till/minimum till, grazing management, riparian buffer establishment/restorations and critical area plantings. An Information and Education program will be developed to inform producers in the project area of the project needs, opportunities to participate, and accomplishments.

PROJECT DESCRIPTION: The Brown County Water Quality Improvement Project will target the reduction of nutrient and sediment loads in tributaries and lakes. During the next two years, project staff will install BMPs to reduce nutrient and sediment load from agricultural runoff, sedimentation to the lakes from shoreline erosion, and provide public education and information.

Activities planned include installation of: Animal Waste Management System(s), Grazing Management, Upland Habitat Improvements, Crop Rotation/Residue Management, Critical Area Plantings, Alternate Watering Systems, Riparian Buffer Establishment/Restorations, Urban BMPs to reduce sedimentation, and an Information & Education program.

2005 CLEAN WATER STATE REVOLVING FUND LOAN: $956,441 MATCH: $1,669,467
FY-2002/2005: SD 319 FUNDS: $165,372
FY-2009: SD 319 FUNDS: $790,800
OTHER FEDERAL FUNDS: $381,603 319 FUNDED FTE'S 2
TOTAL PROJECT COST: $2,806,101

1.0 PROJECT PROPOSAL SUMMARY SHEET- SEE COVER SHEET

2.0 STATEMENT OF NEED

2.1 Elm Lake is a drinking water source for the City of Aberdeen, the third largest city in South Dakota. Elm River and the Maple River store and convey water to the city of Aberdeen for use as drinking water needs. Elm Lake is listed on the priority list of Section 319 Nonpoint Pollution Control projects. During 1994, the South Dakota Department of Environment and Natural Resources (DENR) contacted the Brown-Marshall Conservation District and discussed the need for a watershed assessment for Elm Lake. The conservation district wanted the assessment completed and secured financial assistance from Brown County and the City of Aberdeen to match available 314 Clean Lakes funding. The watershed assessment began during 1995.

DENR completed a watershed assessment for Elm Lake during September 1998. The main components of the assessment included in-lake water quality monitoring, tributary monitoring, and a land-use assessment. The assessment included eleven tributary monitoring sites and four in-lake-monitoring sites. Agricultural Non-point Source computer model (AGNPS) was used during the assessment.

The upper portion of the watershed, approximately 59,520 acres above Pheasant Lake Dam in North Dakota, was not included in the Elm Lake assessment. This area was studied by the North Dakota Department of Health. An assessment report was completed in 2002. Implementation plans for this watershed area in the developmental stages.

Reaches of Maple River, Willow Creek, and Dry Branch Creek have not been studied. However, based on information, many, if not all, contain the same types of nutrients and sediment sources that were observed during the Elm Lake watershed assessment.

The Carlson (1977) Trophic State Index for Elm Lake was determined during the assessment process. The total phosphorus TSI was in the hyper-eutrophic catagory (88.2). The Secchi depth (58.4) and chlorophyll *a* (51.3) TSI's were in the eutrophic category. The phosphorus TSI is a strong indicator of excessive amounts of nutrients in Elm Lake. The average in lake TSI rating was 66.7, slightly over the eutrophic and into the hyper-eutrophic classification.

Immersion recreation and limited contact recreation beneficial use impairment has been linked to elevated levels of nutrients, suspended solids, and noxious aquatic plants. The City of Aberdeen is most concerned with the impairment of the water quality which supplies the City of Aberdeen with drinking water. Many of the same BMPs used to improve water quality for domestic use will also improve immersion recreation and limited contact recreation uses as well.

A total maximum daily load (TMDL) for Elm Lake has been developed and approved by EPA. The TMDL calls for a 60 percent reduction of phosphorus from the watershed.

Elm Lake is a 1,209 acre man-made lake located in the northwest corner of Brown County. Brown County is located in north central South Dakota. The Elm River, located above and below the lake, has a contributing watershed of over 200,000 acres. Willow Creek Dam is also located in the northwest corner of Brown County. Water from Willow Creek Dam merges with the Elm River upstream of the Aberdeen waste water treatment facility. Dry Branch Creek merges with the Elm River down stream of Elm Lake and up stream from the confluence of the Elm River and Maple River. Maple River merges with the Elm River upstream of the Willow Creek Dam.

The Elm Lake dam was constructed to provide a recreation area and drinking water storage supply for the city of Aberdeen, South Dakota. Currently, South Dakota School and Public Lands holds the easement for Elm Lake Dam. The city of Aberdeen owns the water rights to the top 12 feet of the pool below the crest elevation of the primary spillway. The city has a draw down outlet consisting of two 24-inch cast iron pipes extending through the earthen embankment.

The City of Aberdeen holds water rights to Elm Lake, Willow Creek Dam and Elm River. The City owns and operates structures on all of the aforementioned waterbodies to manage the water flow to a water treatment facility. All of the waterbodies currently support several fish species. However, the population of Black Bullheads is increasing which could create significant water quality problems in the future.

The Elm Lake Watershed has large percentages of cultivated field, range land and pasture. The other types of land uses are urban and water bodies, which are very small by comparison. Very similar land uses are present throughout the project area, with the exception of the Moccasin Creek watershed, which has a larger percentage of urban land use.

2.2 DENR completed a watershed assessment for Moccasin Creek, Brown County, South Dakota during 2002. The main component of the assessment consisted of in-stream water quality monitoring, tributary and storm sewer monitoring, and land-use assessment. The final report was completed during 2003. Recommendations contained in the report are being used to implement BMPs in targeted areas that are a major loading source in the watershed. DENR recently reclassified Moccasin Creek as a marginal warm water fishery beginning at Melgaard Road in Aberdeen. With the new fishery classification comes a change in the water quality standards for that section of Moccasin Creek. BMPs implemented will result in improvement in water quality to Moccasin Creek.

2.3 Richmond Lake is an 840-acre man-made lake located in Brown County, South Dakota. The Richmond Lake watershed encompasses approximately 103,000 acres and is drained by Foot Creek. The damming of Foot Creek northwest of the city of Aberdeen, South Dakota, created the lake, which has an average depth of 12.0 feet and deepest depth being 25+ feet. The outlet for the lake empties back into Foot Creek, which empties into Moccasin Creek and eventually reaches the James River.

The Richmond Lake Watershed Assessment Project was conducted from February 2003 through August 2004 as a result of Richmond Lake being placed on the most recent South Dakota 2006 303(d) waterbody list due to its trophic status.

The Richmond Lake project coordinator completed the watershed assessment during August 2004. The main components of this assessment included in-lake water quality monitoring, tributary monitoring, and a land-use assessment. The assessment included three in-lake sampling sites and six tributary monitoring sites. Agricultural Non-point Source computer model (AGNPS) was used during this assessment as well.

Findings from the assessment show that tributaries of the Richmond Lake watershed drain predominately pasture land which accounts for approximately 81 percent of the total, leaving only 18% for cropland. The majority of the cropland was found to be relatively close to Richmond Lake, but located on flat ground with little or no runoff. Most of the watershed sediment and nutrient loading to the lake comes from two major tributaries which feed into the north and west arms of the lake. Loadings of sediment and nutrients have increased the severity of the algal blooms in the lake by overloading the system with phosphorus.

The Carlson (1977) Trophic State Index for Richmond Lake was determined during the assessment process. The median trophic state for Richmond Lake during 2003 and 2004 was 67.4, placing it in the hypereutrophic category.

A total maximum daily load (TMDL) for Richmond Lake has been developed and approved by EPA. The TMDL calls for a 20 percent reduction of phosphorus from the watershed.

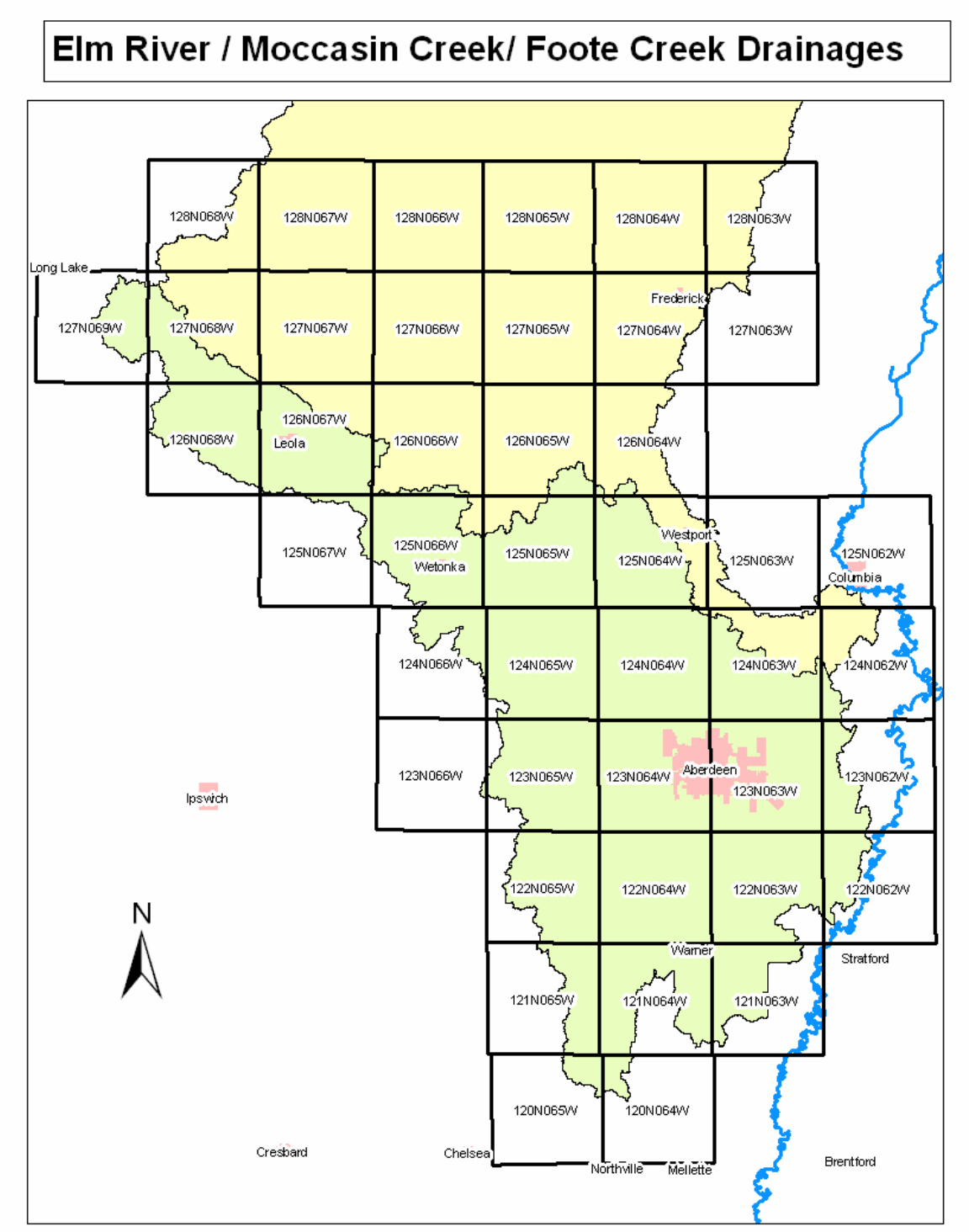
The beneficial uses assigned to waterbodies in the project area are shown in Table 1.

Table 1: Designated Beneficial Uses for Elm Lake, Elm River, Maple River, Moccasin Creek, and Richmond Lake

Designated Beneficial Use:	Elm Lake	Elm River	Maple River	Moccasin Creek	Richmond Lake
Domestic Water Supply	X	X	X		
Warm Water Marginal Fish Life Propagation				X	
Warm Water Permanent Fish Life Propagation	X	X			X
Warm Water Semi-Permanent Fish Life Propagation			X		
Immersion Recreation	X	X			X
Limited Contact Recreation	X	X	X	X	X
Wildlife Propagation and Stock Watering	X	X	X	X	X
Irrigation	X	X	X	X	

2.4 See attached Map (Figure 1)

Figure 1 (Targeted Sections)



2.5 Elm Lake, Elm River, Maple River, Dry Branch Creek, Moccasin Creek, and Richmond Lake watersheds cover a large portion of Brown County. Brown County is located in the James River Watershed. In general, the area is characterized by gently undulating to hilly and has many potholes, sloughs, and lakes throughout the region. Glacial deposits of late Wisconsin age, as much as several hundred feet deep, overlie cretaceous bedrock. Deposits consist mainly of poorly sorted glacial till, stratified glacial outwash, and alluvial sediment. The elevation in the watersheds ranges from 2200 feet Mean Sea Level (MSL) in the northwestern portion of the Elm Lake watershed to below 1300 feet MSL at the outlet of Elm Lake. The watershed receives an annual precipitation of 24 inches, of which 75 percent is received between April and October. The average annual snowfall is 50 inches.

Extended spring runoff and major storms have caused the Elm River, Maple River and Moccasin Creek and their associated tributaries to produce high concentrations of nutrients and solids originating primarily from agricultural lands and animal feeding operations. Tributaries to the Elm Lake deliver the largest nutrient and sediment loads to the lake, although areas of shoreline erosion throughout the lake also contribute to the problem. The high sediment and nutrient loads have resulted in increased in-lake turbidity. In-lake macrophytes are sparse to nonexistent and algae blooms are experienced during the summer. Similar conditions exist within the larger watershed although there have not been studies to show the exact correlation.

2.6 The watershed assessment and AGNPS model evaluated 53 livestock feeding operations in the Elm Lake Watershed. The model's feedlot rating identified 10 livestock operations upstream from Elm Lake in which improvements can be made to improve water quality. BMPs at these 10 sites would reduce phosphorus loading to Elm Lake by 60%. The operations, which have the highest ranking and thus the highest priority, are draining directly into tributaries that lead to the lake. Several operations west and north of the lake have intermittent tributaries that flow across pastures and sloughs before reaching other tributaries that directly contribute to the lake. The AGNPS rating did not indicate they were a significant problem.

The watershed assessment and AGNPS model evaluated 47 animal feeding operations in the Richmond Lake Watershed. Targeting the first 5 lots on the assessments loading data list (55% of the AFO Load) will reduce phosphorus loading by approximately 6%.

The AGNPS and FLUX models were used to evaluate the movement of sediment and nutrients in the watersheds. The models identified critical cells throughout the watersheds where increasing residue cover or improving riparian health would result in significant reductions in nutrients and sediment.

The sub-watersheds are made-up of un-named tributaries that enter Elm Lake and Richmond Lake. The watershed assessment determined that water quality is seasonal. Typically, the largest nutrient and sediment concentrations and loading occurs during the spring. The spring runoff is mostly surface flow and occurs when the ground is frozen or saturated, resulting in greater nutrient transportation from the lake into the next watershed. Late spring and summer have rainfall events of higher intensity that can cause sheet and rill erosion on cropland resulting in high amounts of phosphorus, nitrogen, and sediment being delivered downstream. Continuous or summer long grazing also reduces the amount of vegetative cover on both upland and riparian zones which allows more runoff and transport of nutrients. Conservation practices that promote leaving crop residue undisturbed, promote installing animal waste systems and grazing systems, implement buffers and waterways that encourage healthy riparian zones are beneficial to treat these conditions.

Most of the land adjacent to these water bodies is privately owned. Nearly all households and recreational facilities located adjacent to Elm lake are connected to septic systems. Gravel/shale depths promote leaching of the septic systems into the water bodies. All homes and cabins around Richmond Lake are connected to a central sewer system.

3.0 PROJECT DESCRIPTION

3.1 The Brown County Water Quality Improvement Project will address nutrient and sediment problems in the Elm Lake, Elm River, Maple River, Moccasin Creek, and Richmond Lake watersheds. The project goal is to improve the water quality of Elm Lake, Elm River, the Maple River, Moccasin Creek, and Richmond Lake by installing BMPs in the project area that will restore/protect the beneficial uses and implement the TMDLs developed for the waterbodies. Refer to Table 2 for our milestone status. Refer to Tables 3 and 4 for project budget information.

Table 2: Project Milestones and Status

Milestone	Project Goal Elm/Maple/Willow/Moccasin Watersheds	Quantity Completed as of 9/22/08 Elm/Maple/Willow/Moccasin Watersheds	Project Goal Richmond Lake Watershed
Ag Waste Systems(sites)	9	6 completed, 1 in progress	5
Grazing Management(acres)	12,274	8169	4000
Sediment Control			
Nutrient Control			

Critical Area Seeding(acres)	1,318	331.4	
Riparian Restoration(acres)	5,733	666	2500
Urban Runoff Improvements	4		
Information and Education			
News Articles	45	40	8
Tours	15	9	2

3.2 Reducing non-point source pollutants in the watersheds will improve the water quality for downstream drinking water users; improve habitat for upland and aquatic species, and improve the recreational uses of the water bodies. Improving vegetation and managing grazing along these water bodies will reduce shoreline erosion and provide buffers that prevent nutrients and sediment from entering the lakes and streams, benefiting recreation and improving water quality. In addition, improved vegetation above and below the water line will aid in esthetic quality of the streams to enhance the fishery.

Table 3: Project 319 Budget-Elm Lake/River, Maple, Willow, Moccasin Creek Watersheds

Budget Categories	FY-2002/2005 319 Funds **$ 236,160.30**	319 Funds Spent as of 9/22/08	**319 Remaining**
Salaries			
Clerical Staff	$ 369.93	$ 369.93	**$ -**
Coordinator	$ 83,717.16	$ 27,860.73	**$ 55,856.43**
Proj. Board			
Non-Salary			
Computer Software	$ 3,254.00	$ -	**$ 3,254.00**
Transportation	$ 9,155.21	$ 1,142.93	**$ 8,012.28**
BMP			
Ag. Waste System	$ 57,284.30	$ 41,414.57	**$ 15,869.73**
Ag. Waste System Design	$ 18,000.00		**$ 18,000.00**
Grazing Management	$ -	$ -	**$ -**
Riparian Restoration	$ 61,789.70	$ -	**$ 61,789.70**
Critical Area Planting	$ 2,590.00	$ -	**$ 2,590.00**
Information/Education			
Totals	**$ 236,160.30**	**$ 70,831.16**	**$ 165,372.14**

Table 4: Project CWSRF Budget

Budget Categories	Original Budget 2005 CWSRF Funds **$1,102,506.00**	CWSRF Funds Spent as of 9/22/08	CWSRF Remaining	**New Budget Oct. 2008-2010**
Salaries				
Clerical Staff	$10,900.00	$526.68	$10,373.32	**$10,373.32**
Coordinator	$92,000.00	$4,817.30	$87,182.70	**$87,182.70**
Proj. Board	$9,500.00		$9,500.00	**$9,500.00**
Non-Salary				
Computer Software	$11,000.00		$11,000.00	**$5,000.00**
per diem	-			
Transportation	$29,000.00	$224.96	$28,775.04	**$20,000.00**
BMP				
Ag. Waste System	$450,000.00	$109,742.19	$340,257.81	**$300,000.00**
Ag. Waste Design	$124,000.00		$124,000.00	**$50,000.00**
Grazing Management	$108,247.00	$28,976.06	$79,270.94	**$70,000.00**
Riparian Restoration	$200,000.00	$895.00	$199,105.00	**$199,105.00**
Critical Area Planting	$65,000.00	$882.81	$64,117.19	**$42,000.00**
Stormwater Sediment Traps	-			**$160,420.98**
Information/ Education	$2,859.00		$2,859.00	**$2,859.00**
Totals	$1,102,506.00	$146,065.00	$956,441.00	**$956,441.00**

*******CWSRF budget to be spent only on Elm, Willow, Maple, and Moccasin Creek Watersheds**

Reaching six objectives will lend to attaining the project goal:

- Reduce phosphorus loading from the Elm Lake watershed by 60 percent by targeting livestock operations
- Reduce sediment and nutrient loading by installing BMPs in the watersheds
- Urban runoff improvements
- Reduce phosphorus loading in the Richmond Lake watershed by 20 percent by installing BMPs in the watershed
- Implement an Information and Education program for the project
- Evaluate and Report Project Progress

The Project Coordinator will document all project activities and report to organizations as to the importance of the information. Other activities to be documented would include, but are not limited to: landowner/operator contacts, development/follow-up contracts, workshop and tour attendance, media and new releases and installation of BMPs. Contracts and conservation plans will be developed by the Project Coordinator with the assistance from the SD DENR and NRCS. All information and activities collected during the project will be compiled in a final report.

Objective 1: Reduce phosphorus loading from the watershed in the lake by 60 percent by targeting livestock operations to meet the TMDL established for Elm Lake.

Task 1: Review, Design, Construct, and Develop Nutrient Management Plans for Ag Waste Systems in the Elm Lake/River, Maple, Willow, and Moccasin watersheds.

This task will reduce the phosphorus and nitrogen loads entering the waterbodies. Review of existing feeding operations will verify the ag waste needs in the watersheds. This task also includes the installation of up to 3 animal waste management systems assessed on an individual basis to determine contribution to the watershed. The number of systems constructed will be dependent on cost of the system and the amount matched by the landowner. Priority for installing animal waste management systems will be based on the severity of the problem and the willingness of the landowner to participate. Nutrient management plans will be developed and included in the designs.

Product: Animal feeding area review and update for animal feeding sites in the project area. This will be continued throughout the course of the project.

Cost: 1000 hours as part of coordinator's salary 319: $15,000
CWSRF $0

Product: AWMS designs.

Milestone: Design up to 3 through the use of private consultants.

Cost: AWS design- $74,000 319 Funding: $18,000
CWSRF: $50,000
Producer: $2,000 Each

Cost: Waste management plan and sampling- $2,000 319: $0
CWSRF: $2,000

Product: AWMS Constructed/Nutrient Management Plan Developed

Milestone: 3 animal waste management systems and 3 nutrient management plans at targeted locations.

Cost: AWMS/Nutrient Management Plan- $600,000
319 Funding: $15,870
CWSRF: $300,000
Producer: $150,000
EQIP: $134,130

Product: Grazing Management Systems

Reduce sediment and nutrient loading by implementing grazing management practices on 4,105 acres of grazing land in the watershed. Grazing Management systems will include cross fencing, re-establishing riparian areas, water developments, and any other practice in the NRCS Technical Guide Standards that are needed to make the system function.

Milestone: 4,105 acres

Cost: 4,105 acres @ $30.00/acre=$123,150.00
319 Funds: $0
CWSRF: $70,000
Producers: $30,787
EQIP: $22,363

Objective 2: Reduce nutrient and sediment loading from cropland and riparian areas by installing BMPs in the Watershed.

Task 2: Reduce nutrient and sediment loading by installing BMPs on cropland and riparian areas.

Product: Critical Area Seedings

Re-establishment of vegetative ground cover on agricultural fields to reduce erosion. The re-vegetated areas will stabilize soil, reduce damage from sediment, and reduce potential nutrient runoff and erosion.

Site selection will be based on critical areas identified by AGNPS as well as field observations noting the severity of erosion and proximity to tributaries. The reduction in the amount of erosion will be site specific based on the severity of current conditions. A number of these sites may include minor earthwork or shaping to appropriate slope.

Milestone: Implement 987 acres of critical area seeding to reduce sedimentation and reduce potential nutrient runoff.

Cost: $74,000

319 Funding: $2,590
CWSRF: $42,000
Producers: $ 18,500
EQIP: $10,910

Product: Riparian Buffer Restoration

Reducing the amount of phosphorus and sediment loading by improving shoreline vegetation will reduce shoreline erosion and enhance the fishery.

The topography adjacent to the water bodies is steep in many areas. Shoreline erosion is common with several areas being severely eroded. Much of the shoreline is continually grazed through the growing season and serves as the primary water source for livestock. Watershed assessments determined shoreline erosion is related to grazing, livestock watering, and times when water levels are drawn down due to provide drinking water to the City of Aberdeen.

Re-vegetating or stabilizing eroded banks and improving the health and condition of the shoreline vegetation and riparian areas using soft practices such as exclusion by fencing, tree planting or revegetation to reduce excess amounts of sediment, organic material, nutrients, pesticides, and other pollutants in surface runoff, and reduce excess nutrients and other chemicals in shallow ground water flow.

Milestone: Implement vegetative bank stabilization techniques on 5,067 acres within the watersheds that have eroded or have poor vegetative cover.

Cost: $380,025

319 Funding: $61,790
CWSRF: $199,105
Producers: $102,630
EQIP: $16,500

Objective 3: Install urban runoff BMPs –We will use the Moccasin Creek assessment as a guide for BMP implementation to reduce sediment load into the creek. .

Task 3: Sediment load reduction from urban runoff.

Product: Installation of BMPs to reduce sediment loads at storm sewer outfalls.

Milestone: Install 4 storm water sediment traps at various locations along Moccasin Creek.

Cost: $200,000

CWSRF: $160,421
City of Aberdeen: $39,579

Objective 4: Reduce phosphorus loading in the Richmond Lake watershed by 20 percent by installing BMPs in the watershed.

Task 4: Design and Construct and Develop Nutrient Management Plans for Ag. Waste Systems in the Richmond Lake watershed.

This task will target the top five feedlots as listed in the Richmond Lake assessment. Installing animal waste management systems on these sites will reduce lake phosphorus loading by approximately 6 percent. Priority will be based on the ranking according to the assessment and landowners willingness to participate. Nutrient management plans will be developed and included in the designs.

Product: AWMS designs

Milestone: Design up to 5 through the use of private consultants.

Cost: AWS design: $123,000

FY-2009 319 Funding: $73,800
Producers: $6,150 each
EQIP: $18,450

Product: AWMS Constructed/Develop Nutrient Management Plan.

Milestone: 5 animal waste management systems at targeted locations.

Cost: Ag Waste Systems: $1,000,000

FY-2009 319 Funding: $600,000
Producers:$250,000
EQIP: $150,000

Product: Grazing Management Systems

Reduce sediment and nutrient loading by implementing grazing management practices on 4,000 acres of grazing land in the watershed. Grazing management systems will include cross fencing, re-establishing riparian areas, water developments, and any other practice in the NRCS Technical Guide Standards that are needed to make the system function. Priority will be given to areas in closest proximity to the lake itself.

Milestone: 4,000 acres

Cost: 4,000 acres @ $30.00/acre=$120,000

FY-2009 319 Funding: $72,000
Producers: $30,000
EQIP: $18,000

Task 5: Reduce nutrient and sediment loading by installing BMPs on riparian areas.

Product: Riparian Buffer Restoration

Reducing the amount of phosphorus and sediment loading by improving shoreline vegetation will reduce shoreline erosion and enhance the fishery.

The topography adjacent to the water bodies is steep in many areas. Shoreline erosion is common with several areas being severely eroded. Much of the shoreline is continually grazed through the growing season and serves as the primary water source for livestock. Watershed

assessments determined shoreline erosion is related to grazing and livestock watering.

Re-vegetating or stabilizing eroded banks and improving the health and condition of the shoreline vegetation and riparian areas using soft practices such as exclusion by fencing, tree planting or revegetation to reduce excess amounts of sediment, organic material, nutrients, pesticides, and other pollutants in surface runoff, and reduce excess nutrients and other chemicals in shallow ground water flow. A number of these sites may include minor earthwork or shaping to an appropriate slope

Milestone: Implement vegetative bank stabilization techniques on 2,500 acres within the watershed that have eroded or have poor vegetative cover.

Cost: $75,000

FY-2009 319 Funding: $45,000
Producers: $18,750
EQIP: $11,250

Objective 5: Educate the landowners, operators and local people of the value of implementing Best Management Practices.

Task 6: Develop and implement an Information and Education Plan. The education and information activities will keep the people in the watershed and surrounding area informed of opportunities to implement practices and provide updates on the project accomplishments.

Product: News Articles.

Develop and produce a water quality and watershed management public information and education program targeting people who live in the watershed.

Milestone: Publish 14 news articles in the local newspaper regarding the project goals, objectives, and status.

Cost: $1,500

319: $0
CWSRF: $1,100
Local Cash $400

Product: Field tours of watershed projects.

Conduct on-site public water quality and project information tours.

Milestone: Conduct 6 tours of the different projects within the watershed.

Cost: $1,759 319: $0
CWSRF: $1,759

Objective 6: Evaluate and Report Project Progress.

Task 7: Bi-annual GRTS reports and a final project report will be prepared and submitted to DENR using the project coordinator to track the location and funds used to install BMPs.

Task 8: Produce a final written report.

Product: Bi-annual reports.

Product: Final Project Report

Milestone: Write bi-annual GRTS reports and one final report based on BMPs installed in the watersheds.

Cost: Included in coordinator's salary. 319: $0
CWSRF: $0

3.3 MILESTONE TABLE FOR BROWN COUNTY WATER QUALITY IMPROVEMENT PROJECT

			Year 6 '08				Year 7 '09				Year 8 '10			
TASK/RESPONSIBLE ORGANIZATIONS	OUTPUT	QTY	1	2	3	4	1	2	3	4	1	2	3	4
OBJECTIVE 1														
TASK 1- REVIEW, DESIGN, AND CONSTRUCT AG WASTE SYSTEMS AND DEVELOP	REVIEW AND UPDATE DATA													
NUTRIENT MANAGEMENT PLANS IN THE ELM, MAPLE, WILLOW, MOCCASIN CREEK	DESIGN ANIMAL WASTE SYSTEMS	3				1		1		1				
WATERSHEDS	INSTALL AWMS	3					1		1		1			
	DEVELOP NUTRIENT MGMT PLAN	3				1		1		1				
TASK 2- GRAZING MANAGEMENT	DEVELOP GRAZING PLANS	4,105 ac				1368		1368			1369			
GROUP 1,2,3,4,5,6														
OBJECTIVE 2														
TASK 1- CRITICAL AREA SEEDINGS	REESTABLISH VEGETATION	987 ac				187		400				400		
TASK 2- RIPARIAN BUFFER RESTORATION	RIPARIAN BMP'S	5,067 ac				1689		800	889			1689		
GROUP 1,2,3,4,5,6														
OBJECTIVE 3														
TASK 1- SEDIMENT LOAD REDUCTION FROM URBAN RUNOFF	SEDIMENT TRAPS ON STOR SEWER OUTLETS	4						1	2			1		
GROUP 1,3,4,5,6														
OBJECTIVE 4														
TASK 1- REVIEW, DESIGN, AND CONSTRUCT AG WASTE SYSTEMS AND DEVELOP	DESIGN ANIMAL WASTE SYSTEMS	5				1	1	1		1	1			
NUTRIENT MANAGEMENT PLANS IN THE RICHMOND LAKE WATERSHED	INSTALL AWMS	5						2	1			2		
	DEVELOP NUTRIENT MGMT PLAN	5				1	1	1		1	1			
TASK 2- GRAZING MANAGEMENT	DEVELOP GRAZING PLANS	4,000 ac						1000	1000			2000		
TASK 3- RIPARIAN BUFFER RESTORATION	RIPARIAN BMP'S	2,500 ac						1250				1250		
GROUP 1,2,3,4,6,7														
OBJECTIVE 5														
TASK 5- NEWS ARTICLES	DEVOLOP NEWS ARTICLES	14				2	2	2	2	2	2	2		
TASK 6- TOURS OF PROJECTS	TOURS	6			1	1		1	1		1	1		
GROUP 1,2,3,4,6														
OBJECTIVE 5														
TASK 1- REPORTING	GRTS REPORTS	4				1		1		1		1		
	FINAL REPORT	1											1	
GROUP 1,2,3,4,6														

Group 1- City of Aberdeen, local sponsor hired project coordinator and business manager, responsible for project coordination, payments, recording match and in-kind contributions, progress reporting
Group 2- McPherson County Conservation District- provide technical assistance
Group 3- Brown Conservation District- provide technical assistance
Group 4- Natural Resource Conservation Service- provide financial assistance through EQIP, technical assistance to plan and design BMPs
Group 5- Elm Lake Watershed Landowners- implement BMPs, provide financial assistance through cost share and in-kind contributions
Group 6- SD Dept. of Environment and Natural Resources- technical assistance and oversight of 319 funds and program management
Group 7- Richmond Lake Watershed Landowners- Implement BMPs, provide financial assistance through cost share and in-kind contributions

3.4 **Permits**

Corps of Engineer 404, Water Rights (DENR), and Natural Resource Conservation Service approval for building sediment ponds on CRP lands. Cultural Resources and Threatened & Endangered Species Compliance as well as Storm Water Construction Permits through DENR.

3.5 **Lead Project Sponsor**

The city of Aberdeen is the lead local sponsor for this project. The city of Aberdeen receives some of its drinking water from the Elm Lake Reservoir, Elm River, Maple River and Willow Creek reservoir. The project area includes portions of three different conservation districts: Dickey Conservation District in Dickey County North Dakota; Brown-Marshall Conservation District in northern of Brown County South Dakota; and McPherson Conservation District in McPherson County South Dakota. The management, administration, and implementation of the project will be a cooperative effort between the city of Aberdeen, NRCS, and the conservation districts.

3.6 Responsibilities and roles for operation and maintenance of BMPs will be provided through agency/landowner/user contracts. The city will determine the frequency of on-site O&M evaluations during the life of the project. The city will also be responsible to assign personnel to conduct the O&M evaluations.

4.0 COORDINATION PLAN

4.1 The entities involved in the restoration of the Brown County Water Quality Improvement Project plan to carry out the planning and implementation along with their area(s) of responsibility are described below.

- **City of Aberdeen:** Serve as the project sponsor and provide funding for project implementation. Administration of the project, coordination between agencies, and hire project personnel. Project staff will address all facets of the 319 project including planning, reporting, information and education, inventory, and assistance in BMP implementation.
- **Natural Resource Conservation Service:** McPherson County, Brown County, Dickey County: Providing engineering and technical assistance for design and construction of BMPs.

Provide cost-share funds for BMP and AWSM implementation through EQIP program.

- **South Dakota Department of Environment & Natural Resources:** Administer the project grant and provide technical assistance on matters pertaining to water quality.
- **Brown-Marshall, McPherson, and Dickey County Conservation Districts:** Provide technical assistance.
- **North Dakota Department of Health:** Administer the project grant and provide technical assistance on matters pertaining to water quality for the ND portion of the Elm Lake Watershed
- **South Dakota State Cooperative Extension Service:** Assist with prioritization of information and education for integrated crop management.
- **319 Grassland Management and Planning Team:** Provide technical assistance for planning and implementing grazing management systems.
- **Brown County:** Provide cost share funds.
- **James River Water Development District:** Provide cost share funds.
- **US Fish and Wildlife Service:** Provide technical assistance for project activities in their area of expertise and provide program funding to assist with grazing systems.
- **South Dakota Game Fish and Parks:** Provide assistance on activities impacting the Elm Lake fishery.
- **Pheasants Forever:** Provide cost share funds.

4.2 The Elm Lake Watershed Assessment, Richmond Lake Watershed Assessment, and Moccasin Creek Assessment Projects have been completed and approved by EPA. The City of Aberdeen will continue to pursue similar improvements to areas within and outside the study assessment area. Local landowners in the watersheds are ready for implementation.

4.3 The City of Aberdeen is committed to implementing this project as evidenced by the grant application.

4.4 The improvement of water quality for this project is based on the recommendations of the Elm Lake, Richmond Lake, and Moccasin Creek Assessments. Technical input for several aspects of this project will be provided by government agencies and engineering consultants.

4.5 This project utilizes a mix of federal, state, and local funds for each of the objectives for the project. The distribution of funds is outlined in the budget.

5.0 EVALUATIONS AND MONITORING

5.1 **Data Collection:** There will be no water samples collected for the watershed during the life of the project to monitor or evaluate project accomplishments. There are plans to sample city storm sewers for fecal coliform bacteria.

5.2 **Monitoring Strategy:** Photo points have been established to monitor selected sites of riparian management and rotational grazing in order to monitor changes on specific sites in the project area. Photos will be taken before and after BMPs are installed to document accomplishments. Photos will be computer friendly and kept in retrievable format.

A monitoring program for the watershed to assess the effectiveness of the project in improving water quality will not be implemented until the project is nearing completion of implementation. Water quality monitoring will be implemented as a "Phase III" effort to revisit locations identified with problems in the assessment to monitor if improvements occurred after BMPs have time to establish.

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5.3 **Data:** The City of Aberdeen will be responsible for collecting, storing, and managing data collected during implementation of this project. South Dakota DENR will provide technical assistance and guidance to assist the City of Aberdeen to set up the appropriate record systems and computer software for project data collected. Information regarding the installation of BMPs shall be entered into DENRs Project Tracker System.

5.4 **Models:** The City of Aberdeen will utilize the South Dakota DENR for technical assistance and training on which models to use and how to use them. The STEPL model will be used to evaluate the impact of BMP installation on riparian and grazing management projects. AGNPS will be used to determine phosphorus reduction from AWMS installation.

6.0 Project Budget

PART 2 FUNDING	2008	2009	2010	Total	Match			Other Federal	319 Funds	**319 Funds**
	Year 6	Year 7	Year 8	Costs	Cash	In-Kind	CWSRF	EQIP	2002/2005	**2009**
Personnel/Support										
Project Staffing	19,501	70,000	70,000	159,501	16,462	0	87,183	0	55,856	
Office Rent/Utilities	1,000	2,400	2,400	5,800	0	5,800	0	0	0	
Transportation	2,000	13,006	13,006	28,012	0	0	20,000	0	8,012	
Clerical Staff	555	4,909	4,909	10,373	1,141	0	10,373	0	0	
Project Board of Supervisors	2,710	8,395	8,395	19,500	10,000	0	9,500	0		
Administrative										
Phone	170	528	529	1,227	1,227		0	0	0	
Office supplies	100	500	400	1,000	0	1,000	0	0	0	
Computer/Software	0	4,127	4,127	8,254	0	0	5,000	0	3,254	
Objective 1: Reduce Phosphorus Loading from Animal Feeding Operation Elm, Willow, Maple, Moccasin Creek Watersheds										
Ag Waste Design	24,000	25,000	25,000	74,000	6,000		50,000		18,000	
Animal Waste Systms/Nutr. Mgt Plan	200,000	200,000	200,000	600,000	60,000	90,000	300,000	134,130	15,870	
Grazing Management Systems	41,040	41,055	41,055	123,150	9,236	21,551	70,000	22,363	0	
Objective 2: Reduce Nutrient and Sediment Loading in the Watershed										
Critical Area Plantings(crplnd)	14,000	30,000	30,000	74,000	5,500	13,000	42,000	10,910	2,590	
Riparian Buffer Restorations	126,675	126,675	126,675	380,025	30,789	71,841	199,105	16,500	61,790	
Objective 3: Urban Runoff Improvements										
Sediment load reduction	0	100,000	100,000	0	39,579	0	160,421	0	0	
Objective 4: Reduce Phosphorus Loading from Richmond Lake Watershed by 20% by installing BMPs										
Ag Waste Design	0	61,500	61,500	123,000	30,750			18,450		**73,800**
Animal Waste Systms/Nutr. Mgt Plan	0	500,000	500,000	1,000,000	75,000	175,000		150,000		**600,000**
Grazing Management Systems	0	60,000	60,000	120,000	9,000	21,000		18,000		**72,000**
Riparian Buffer Restorations	0	37,500	37,500	75,000	5,625	13,125		11,250		**45,000**
Objective 5: Implement an Information and Education Program										
News Articles	500	500	500	1,500	400	0	1,100	0	0	
Public Meetings/Workshops	359	700	700	1,759		0	1,759	0	0	
Objective 6: Reporting										
Reports				0	0	0	0		0	
Total	432,610	1,286,795	1,286,696	2,806,101	300,709	412,317	956,441	381,603	165,372	**790,800**

7.0 PUBLIC INVOLVEMENT

Public meetings will be held. Newspaper articles will be published at least 25 times during the project to increase public awareness. Tours will be conducted in the project area to develop awareness of the watershed problems and show case accomplishments.

8.0 ENDANGERED SPECIES ACT

EPA will conduct an informal biological evaluation with the aid of the U.S Fish and Wildlife Service (USFWS) and the DENR regarding potential effects of the project on threatened or endangered species that may exist in the project area. The following species will likely be of concern for this project: Bald Eagle, Whooping Crane, and Topeka Shiner.

8.1 Evaluation of the Whooping Crane:

A. Description of affected environment/species biology: The Whooping crane is an endangered species with known certainty of occurrence in Brown County. They are often found in North and South Dakota during spring and fall migration. Since the bird is only present during migration and stops at a location to feed or rest, they do not remain in any location for any length of time.

B. Conservation Measures: The watershed projects plans to install BMP's that will require large machinery for earth moving and seeding. The BMP's will be widely dispersed and of low impact. If a crane or cranes are observed at any project work site, all mechanical activities at the site will be suspended until the bird(s) leave the site under their own volition.

C. Conclusions: The project will have no negative effect on the Whooping Crane.

8.2 Evaluation of the Topeka Shiner:

A. Description of affected environment/species biology: The Topeka Shiner is an endangered species that occurs in the small prairie streams in pools containing clear, clean water. These streams generally have clean gravel, rock or sand bottoms. However, these fish have been found in streams where silt covered these substrata. South Dakota State University (SDSU) is currently involved with the Topeka Shiner Study. Modeling from this study indicates that the Elm River has suitable habitat for the fish. The Topeka Shiner was once abundant and widely distributed throughout the Central Plains and western tall grass region. Present estimate are that the species now inhabits less

than 10 percent of its original geographical range. However, recent findings from the SDSU study suggest that the Topeka Shiner may inhabit significantly more than 10 percent of its original range in South Dakota.

The actions most likely to impact the species are sedimentation and eutrophication (increased mineral and organic nutrients with in the body of water resulting in the decrease of dissolved oxygen) resulting from intensive agricultural development. Feedlot operations on or near streams are also known to impact prairie fishes because of the organic input that causes eutrophication. Intensive land use practices, maintenance of altered waterways, de-watering of streams, tributary impoundments, and channelization are the greatest threats to the Topeka Shiner. Over grazing of riparian zones along streams and the removal of riparian vegetation to increase tillable acreage greatly diminishes a watershed's ability to filter sediments, organic wastes, and other impurities from the stream system.

B. Conservation Measures: Planned riparian buffers will improve riparian and stream habitat conditions at several locations within the project area. Other BMP's to be implemented on cropland, grasslands, and animal feeding area will improve water quality. Ponds constructed for livestock watering will be either excavated or located in the upper portions of the drainage area where flow is always intermittent. Rock stream crossings may be installed. If installed, only a small increase in sediment disturbance at each site and crossing will be constructed very near stream thalweg elevation so a stream barrier is not created. Rock crossings and excavated ponds near intermittent streams will not be constructed during the Topeka Shiner spawning period (May 15 – July 31). In addition, the project sponsors will be approaching the USFWS to participate in this project.

C. Conclusions: The project will address the types of problems that have impacted the Topeka Shiner by improving water quality and stream conditions in the project area. Because of these benefits and the conservation measures, EPA believes that the Elm Lake Watershed Restoration Project may have a beneficial effect, but is not likely to adversely affect the Topeka Shiner if it exists in the project area.